CLAIMS

What is claimed is:

1. A method of setting or resetting a structure in earth with a polymer composition comprising:

forming said polymer composition;

dispersing a conductive material throughout the polymer composition; and

applying said polymer composition to said structure;

wherein the step of forming comprises forming a foamed polyurethane composition and said step of applying comprises applying said foamed polyurethane composition;

wherein the step of forming the foamed polyurethane composition comprises combining polyisocyanate, an organic alcohol component, an asphaltic component, a liquid water-immiscible component in an amount effective to allow formation of a foam of sufficient strength for holding the pole, water, a catalyst, a non-ionic surfactant, a flame retardant, and a conductive material comprising a component selected from the group consisting of carbon nanotubes, fullerenes, carbon nanotube composites, carbon black, carbon fibers, carbon particles, and any combination thereof.

2. The method of claim 1 further comprising forming the foamed polyurethane composition in-situ.

3. The method of claim 1 wherein the composition has a density of about 4-17 pounds per cubic feet and a compression of at least about 30 PSI.

4. The method of claim 1 wherein the conductive material comprises single wall nanotubes having diameters ranging from approximately 0.7 to 2 nanometers and lengths

of up to approximately 20 centimeters; and the level of the single wall nanotubes in the composition is from approximately 0.1 to 6% of the composition.

5. The method of clam 4 wherein approximately 30% of the single wall nanotubes have diameters of approximately 0.7 to 1.2 nanometers and lengths of approximately 2 to 20 microns.

6. The method of claim 1 wherein the conductive material comprises multiwall nanotubes having diameters ranging from approximately 10 to 300 nanometers and lengths of up to approximately 20 centimeters; and the level of the multiwall nanotubes in the composition is from approximately 1 to 8% of the composition.

7. The method of clam 6 wherein approximately 80% of the multiwall nanotubes have diameters of approximately 10 to 30 nanometers and lengths of approximately 1 to 10 microns.

8. The method of claim 1 wherein said step of forming the foamed polyurethane composition further comprises combining

about 30-50% 4,4'-diphenylmethane diisocyanate; about 0.01-30% of an asphaltic component;

about 15-35% of amine phenolic or polyether polyol or combination of both;

about 4-15% of a water-immiscible component;

up to about 2% silicone glycolcopolymer;

less than 1% water;

up to about 1% catalyst selected from the group consisting of amine-based catalyst, tin-based catalyst, and a mixture thereof;

up to about 2% flame retardant; and,

from about 1-20% of the conductive material.

9. The method of claim 8 wherein the 4, 4'-diphenylmethane diisocyanate is about 39.8%; the asphaltic component is about 11.8%; the amine phenolic or polyether polyol or combination of both is about 25%; the water-immiscible component is about 12.6%; the silicone glycolcopolymer is about 1.3%; the water is about 0.20%; the catalyst is about 0.33%; the flame retardant is about 1.6%; and the conductive material is about 7.3%.

10. The method of claim 1 wherein the conductive material is carbon fibers present at a level of 0.1 – 20 % (w/w) of the total composition.

11. The method of claim 1 wherein said step of dispersing conductive material further comprises dispersing doping and coupling agents.

12. The method of claim 11 wherein said doping and coupling agents comprise one or more of tetramethylammonium iodide, crown ethers, and ligands.

13. The method of claim 1 wherein said step of dispersing conductive material comprises dispersing metal or metal alloy.

14. The method of claim 1 further comprising adding a doping material to said polymer composition.

15. The method of claim 14 wherein said doping material comprises a material selected from the group consisting of a crown ether and TMAI.

16. The method of claim 15 wherein said crown ether is 18-crown-6.

17. The method of claim 1 wherein said resetting comprises excavating an area around a structure and replacing excavated material with said polymer composition.

18. The method of claim 1 wherein the conductive material comprises metal or metal alloy.

19. The method of claim 1 wherein the structure is a utility pole.

20. A foamed polyurethane composition produced by the process comprising:

combining polyisocyanate; an organic alcohol component; an asphaltic component; a liquid water-immiscible component in an amount effective to allow formation of a foam of sufficient strength for holding the pole in the presence of water; a catalyst; a non-ionic surfactant; and a flame retardant; and

dispersing a conductive material comprising a component selected from the group consisting of carbon nanotubes, fullerenes, carbon nanotube composites, carbon black, carbon fibers, carbon particles, and any combination thereof, throughout one or more of the components selected from the group consisting of the polyisocyanate, the organic alcohol component, the asphaltic component, the liquid water-immiscible component, the catalyst, the flame retardant, and the non-ionic surfactant.

21. The composition of claim 20 further having a density of about 4-17 pounds per cubic feet and a compression of at least about 30 PSI.

22. The composition of claim 20 wherein the polyisocyanate is 4,4'-diphenylmethane diisocyanate and the foamed polyurethane composition is produced by the process comprising dispersing a conductive material throughout said 4,4'-diphenylmethane diisocyanate.

23. The composition of claim 20 further comprising doping and coupling agents.

24. The composition of claim 23 wherein said doping and coupling agents comprise one or more of tetramethylammonium iodide, crown ethers, and ligands.

25. The composition of claim 20 wherein

said step of combining comprises combining about 30-50% 4, 4'-diphenylmethane diisocyanate, about 0.01-30% of an asphaltic component, about 15-35% of amine phenolic or polyether polyol or combination of both, about 4-15% a water-immiscible component, up to about 2% silicone glycolcopolymer, up to 2% flame retardant, less than 1% water, and up to about 1% catalyst selected from the group consisting of amine-based catalyst, tin-based catalyst, and a mixture of amine-based catalyst and tin-based catalyst; and

said step of dispersing comprises dispersing an amount of conductive material comprising a component selected from the group consisting of carbon nanotubes, carbon nanotube composites, fullerenes, carbon black, carbon fibers, carbon particles, and any combination thereof, throughout one or more of the components selected from the group consisting of the about 30-50% 4, 4'-diphenylmethane diisocyanate, the about 0.01-30% of an asphaltic component, the about 15-35% of amine phenolic or polyether polyol or combination of both, the about 4-15% of a water-immiscible component, the up to about 2% silicone glycolcopolymer, the up to about 2% flame retardant, the less than 1% water; and, the up to about 1% catalyst selected from the group consisting of amine-based catalyst, tin-based catalyst, and a mixture thereof,

wherein the final composition consists of from about 0.1% to about 20 % of the conductive material.

26. The composition of claim 25 wherein the foamed polyurethane composition is produced by the process comprising dispersing a conductive material throughout the 30-50% of 4,4'-diphenylmethane diisocyanate.

27. The composition of claim 25 further comprising doping and coupling agents.

28. The composition of claim 27 wherein said doping and coupling agents comprise one or more of tetramethylammonium iodide, crown ethers, and ligands.

29. The composition of claim 20 wherein said conductive material comprises tetramethylammonium iodide.

30. The composition of claim 20 wherein said conductive material comprises a metal or metal alloy.

31. The composition of claim 20 wherein the step of dispersing a conductive material comprises dispersing single wall nanotubes having diameters ranging from approximately 0.7 to 2 nanometers and lengths of up to approximately 20 centimeters; and the level of single wall nanotubes in the composition is from approximately 0.1 to 6% of the composition.

32. The method of clam 31 wherein approximately 30% of the single wall nanotubes have diameters of approximately 0.7 to 1.2 nanometers and lengths of approximately 2 to 20 microns.

33. The method of claim 20 wherein the step of dispersing a conductive material comprises dispersing multiwall nanotubes having diameters ranging from approximately 10 to 300 nanometers and lengths of up to approximately 20 centimeters; and the level of multiwall nanotubes in the composition is from approximately 1 to 8% of the composition.

34. The method of clam 33 wherein approximately 80% of the multiwall nanotubes have diameters of approximately 10 to 30 nanometers and lengths of approximately 1 to 10 microns.

35. A method of grounding and setting substation ground mats and/or grids comprising excavating an area for said ground mat and/or grid and placing 3 – 6 inches of the composition of claim 20 over connecting copper wire.

36. A method of grounding temporary substations comprising auguring holes around said substation, and applying the composition of claim 20 over conducting connections between said holes.

37. A method of resetting and/or grounding a building comprising applying the composition of claim 20 at or near the foundation of said building.